



Pixel Hybridization FDR

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ATLAS HYBRIDIZATION INTERFACE DOCUMENT

The interface requirements related to hybridization of ATLAS pixel modules are described in this document.

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Distribution List

History of Changes

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1 Introduction

This note summarizes the interface requirements related to hybridization of ATLAS pixel modules. The interface requirements apply to "bare modules" i.e. a pixel module consisting of 16 front-end integrated circuits bump-bonded to a silicon sensor. All bare-pixel modules in ATLAS are identical with the exception of the bump bonding technology used to join the front-end integrated circuits to the sensors. Interfaces to the "bare modules" are defined to be independent of the bump bonding technology.

The interface requirements summarized in this document include the following items:

- envelope requirements
- wire bonding requirements
- module attachment requirements to the pixel local supports
- requirements related to the attachment of flex hybrids to the sensor-side of the "bare module"
- survey requirements

2 Envelope Requirements

A overall module envelope has been defined and is under change control. The envelope drawing is shown in Figure 1. The "bare module" must respect this envelope. The envelope thickness of a "bare module" is 0.58 mm.

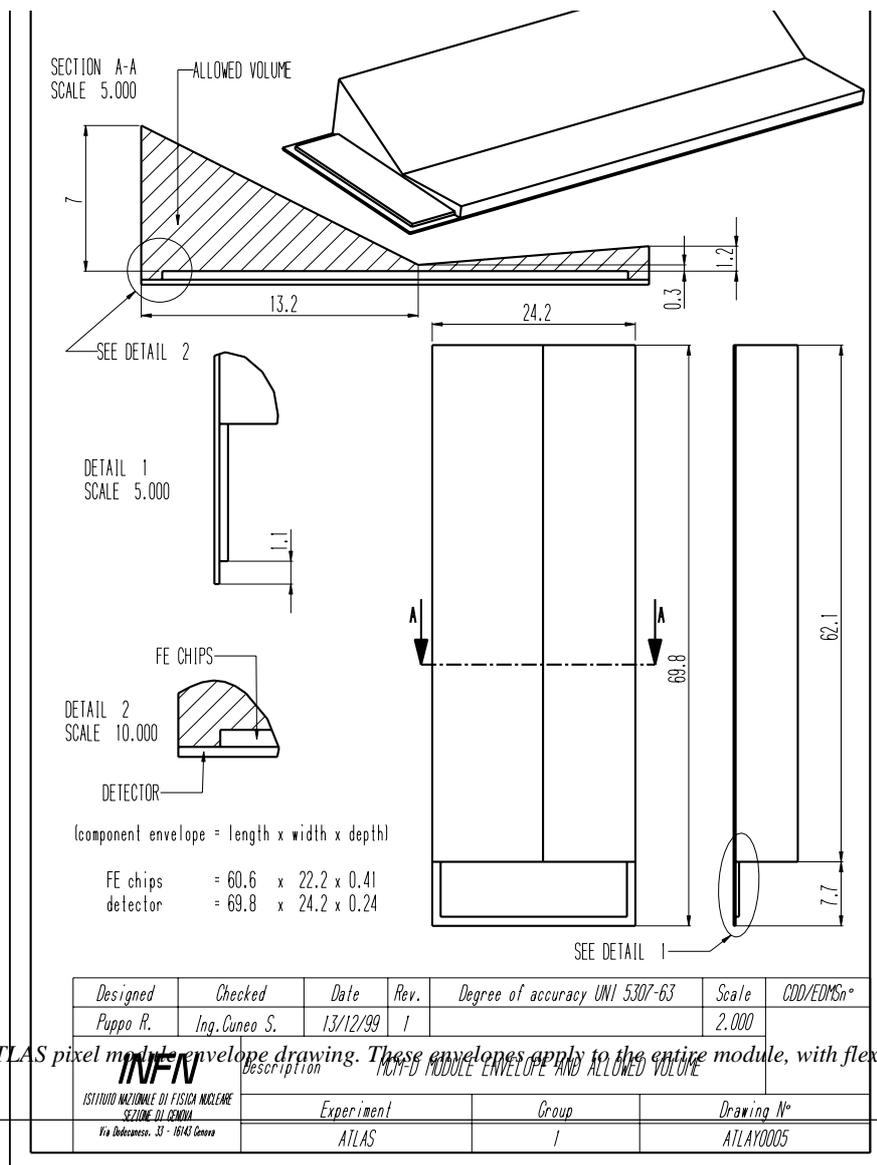


Figure 1. ATLAS pixel module envelope drawing. These envelopes apply to the entire module, with flex hybrid attached.

3 Wire Bonding Requirements

Aluminum wire bonding between the sixteen front-end ICs and the corresponding bond pads on the flex hybrid is required. The bond pads on the "bare module" must be free of contaminants so that reliable bonding can be made. The hybridization vendors must not introduce such contaminants during the bump deposition or flip-chip bonding process. The hybridization vendors and ATLAS must put in place Quality Control/Assurance procedures to monitor possible contaminants or remove them after assembly of a bare module.

4 Module Attachment Requirements

The modules are attached to the pixel local supports - barrel staves or disk sectors. The modules are attached chip-side down to the local supports using a thermal compound. The "bare module" must meet the following requirements for this interface:

- The chip surface must be clean and free of contaminants that would prevent good contact with the thermal compound between the chips and the local support;
- The deviation in height from chip-to-chip on a single module shall not exceed 25 microns. This is a requirement on both the hybridization vendors(control of the bump height) and on IC wafer thinning; and
- The bow of the "bare module" must be controlled but we currently do not have a requirement on the maximum allowed bow of a "bare module". This depends in detail on the attachment compound and procedure - more prototype work is needed to define this requirement.

5 Requirements for Attachment of the Flex Hybrid

The flex hybrid is glued to the sensor side of the "bare module". The hybridization vendors shall not introduce contaminants to the sensor side of the "bare module" that impair the process of gluing the flex hybrid. Monitoring for such possible contamination will be part of the Quality Control/Assurance procedures developed with the hybridization vendors and by ATLAS during the module assembly process.

6 Survey Requirements

Alignment marks are located on the backside of the sensor(the side away from the front-end integrated circuits). Alignment marks may also be present on each of the 16 front-end chips. The hybridization process to be used by the vendors must not remove these marks or obscure these marks. They are used in the final survey of modules during and after attachment to the local supports.